RAYTHEON

TECHNICAL INFORMATION SERVICE

Technical Information

CK6829

MINIATURE MEDIUM-MU DOUBLE TRIODE

The 6829 is a heater-cathode type, medium-mu double triode of miniature construction. The tube features a high zero-bias plate current, a sharp cutoff characteristic, and separate cathode connections for the two sections. It is especially designed for use in electronic computer applications and other "on-off" control applications requiring long periods of operation under cutoff conditions. The 6829 is mechanically rugged and has a heater-cathode structure capable of thousands of cycles of intermittent use.

MECHANICAL RATINGS: (Maximum)

Impact Acceleration	450G
Fatigue (Vibrational Acceleration for Extended Periods)	2.5 G
Bulb Temperature	140°C
Altitude	60,000ft.

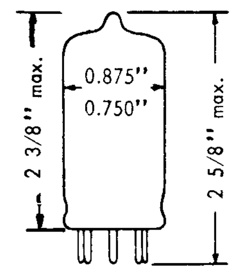
ELECTRICAL DATA

Ratings and Normal Operations	MIL-E-1 Symbol	Test Limit or Design * Min.	Norm. Test Cond.	Test Limit or Design * Max.	MIL-E-1 Units
Heater Voltage Series	Ef:	12.0	---	13.2	V
Heater Voltage Parallel	Ef:	6.0	6.3	6.6	V
Plate Voltage	Eb:	---	150	275	Vdc
Peak Plate Forward Volt.	eb:	---	---	550	v
Plate Dissipation	Pp/p:	---	---	2.2 (Note 4)	Watts
D.C. Grid Voltage	Ec:	-50	0	1.0	Vdc
Peak Grid Volt.	ec:	-100	--- (Note 1)	10	v
Aver. Positive Grid Current	Ic/g:	---	---	1.0	mAdc
Peak Positive Grid Current	ic/g:	---	---	50 (Note 1)	ma
Cathode Current Average	Ik/k:	---	---	20	mAdc
Cathode Current Peak	ik/k:	---	---	160 (Note 1)	ma
Heater to Cathode Volt.	Ehk:	100 (Note 3)	0	100 (Note 2)	v
Cathode Resist.	Rk/k:	---	220	---	ohms
Grid Resistance	Rg/g:	---	---	0.1 Fixed Bias 0.5 Cathode Bias	Meg.
Plate Resistance	rp:	---	7000	---	ohms
			Tests		
Heater Current	If:	420	450	480	mA
Heater Cathode Leakage Ehk=±100 Vdc	Ihk: (Note 5)	---	---	7	µAdc
Plate Current Eb=100 Vdc Rk=0	Ib: (Notes 5 & 6)	12	17	22	mAdc

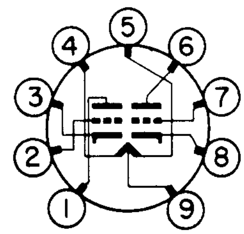
MECHANICAL DATA

ENVELOPE	Glass T6½
OUTLINE	6–8
BASE	Miniature Button 9–Pin
BASING	9A
MOUNTING POSITION	Any
CATHODE	Coated Unipotential

PHYSICAL DIMENSIONS



BASING



BOTTOM VIEW

TERMINAL CONNECTIONS:

- Pin 1 Plate, Unit #2
- Pin 2 Grid, Unit #2
- Pin 3 Cathode, Unit #2
- Pin 4 Heater
- Pin 5 Heater
- Pin 6 Plate, Unit #1
- Pin 7 Grid, Unit #1
- Pin 8 Cathode, Unit #1
- Pin 9 Heater Center–Tap

MINIATURE MEDIUM-MU DOUBLE TRIODE

Ratings and Normal Operations	MIL-E-1 Symbol	Test Limit or Design Min.	Norm. Test Cond.	Test Limit or Design Max.	MIL-E-1 Units
		Tests			
Grid Voltage Ec/Ib = 150 μ Adc Rk = 0	Ec: (Note 5)	---	---	-7.5	Vdc
Grid Voltage Diff. Between Sections Ec/Ib = 150μAdc RK = 0	Δ Ec: (Note 5)	---	---	1.5	Vdc
Plate Current Ef = 5.7V Eb = 100 Vdc Rk = 0	$\Delta\ Ib_{Ef}$:	--- (Notes 3, 6, 5, 7)	---	15	%
Plate Current Eb = 150 Vdc	Ib:	6.3 (Note 5)	---	10.7	mAdc
Transconductance	Sm:	5300 (Note 5)	---	8100	μmhos
Amplification Factor	Mu:	39 (Note 5)	---	55	
Pulse Cathode Curr.	ik:	160 (Note 8)	---	---	ma
Interelectrode Capacitances (No shield)	Cgp:	2.4 (Note 5)	---	3.6	μμf
	Cin:	3.0 (Note 5)	---	5.0	μμf
	Cout: Section 1	.37	---	0.57	μμf
	Cout: Section 2	.30	---	0.46	μμf
	Cpp:	---	---	0.90	μμf
	Cgg:	---	---	0.03	μμf
	Chk:	3.0 (Note 5)	---	5.0	μμf
Vibration Rp = 2000 Ω (F = 25 cps: G = 2.5)	Ep:	--- (Note 5)	---	300	mVac

SPECIAL TESTS AND RATINGS TO INSURE RELIABILITY

Randomly selected statistical samples are subjected to the following tests:

Shock Test – 450 G. 30° hammer angle in Navy High Impact Shock machine. Sample subjected to twenty (20) impact accelerations, five impact accelerations in each of four different positions.

Fatigue Test – 2.5 G. Sample subjected to vibrational acceleration of 2.5 G for 96 hours (32 hours in each of three positions). The sinusoidal vibration is applied at a fixed frequency between 25 and 60 cycles per second.

Glass Strain – A sample is subjected to a forty-eight hour holding period at room temperature. The sample is immersed in water at 97–100°C for 15 seconds and immediately immersed in water at not more than 5°C for 5 seconds. The sample is then dried at room temperature for 48 hours and inspected for evidence of air leaks.

Heater Cycling Life Test – A sample is subjected to 2000 on–off heater cycles at the following conditions: Ef = 7.5V (htrs. in parallel) Ehk = + 135 Vdc; Ec = Eb = 0; Rk = 0. At the conclusion of this test the tubes will not show open heater or cathode circuits or heater to cathode shorts.

Stability Life Test – Sample is operated for 1 hour to assure initial electrical stability. (Δ_t Ib < 10%). Tubes are operated with Ebb = Ecc = 180 Vdc and an Ehk = + 135 Vdc Rk = 0 and an Rg/g of 3.9 meg is used.

Survival Rate Life Test –	Sample is operated 100 hrs to assure electrical stability (Ib > 11 mAdc) and freedom from inoperatives. Tubes are operated under Stability Life Test conditions.
Intermittent Life Test –	1000 hours. Sample is operated under Survival Rate Conditions with a minimum envelope temp. of 140°C.
Cathode Interface Life Test –	500 hours. Sample is operated with Ef = 6.6V, other electrodes disconnected. (Interface Resistance < 50 Ω.)
Pulse Life Test –	500 hrs. Sample is subjected to a grid input pulse of 1% duty cycle.
Altitude –	Sample is subjected to a pressure = 55 ± 5 mm Hg (60,000 ft.) at 500 Vac. to assure freedom from flashover or corona at the pins of the tube.

APPLICATION NOTES

Note 1 – Rating based on a pulse of 10 μsec. duration, 1 percent duty cycle, and 1000 pps repetition rate.

Note 2 – For pulse voltage of less than 1 percent duty cycle, the peak voltage may be 150 volts maximum.

Note 3 – Tie heaters in parallel.

Note 4 – The design max. rating for the combined plate dissipation of both plates is 4.0 watts.

Note 5 – Test each unit separately.

Note 6 – Tie each grid through a 500K resistor (±1%) to the corresponding plate.

Note 7 – Plate Current 2 is the percent change in Plate Current (1) of an individual tube resulting from the change in Ef.

Note 8 – E1c = E2c = −20 Vdc. Grid is driven with pulse circuit as follows: e1c = e2c = +10v; Prr = 1000 pps; tp = 10 μs; tr < 1 μs; tf < 1 μsec. Read peak cathode current in each section separately with opposite section operating under pulse conditions. Preheat at Ef = 6.3 V, with heaters in parallel, for 5 minutes and with no other Voltages applied.

CAUTION – To Electronic Equipment Design Engineers: Special attention should be given to the temperature at which the tubes are to be operated. Reliability will be seriously impaired if maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life test are imposed on the tube and will be reduced appreciably if maximum ratings are exceeded. Both reliability and performance will be jeopardized if filament voltage ratings are exceeded. Life and reliability of performance are closely related to the degree that regulation of the heater voltage is maintained at its center rated value.

* Design maximum ratings, in general, are limiting values, based on bogie tubes, at which satisfactory tube life can be expected under the types of service for which the tube is rated. The design maximum rating for plate dissipation is defined as 120 percent of the product of the plate voltage applied during intermittent life test and the plate current of an average (bogie) tube during the life test, expressed in watts.

ACCEPTANCE CRITERIA

The following tests shall be performed:

For the purpose of inspection, use applicable reliable paragraphs of MIL-E-1 and Inspection Instructions for Electron Tubes.

For miscellaneous requirements, use Paragraph 3.3, Inspection Instructions for Electron Tubes.

Ref.	Test	Conditions	AQL(%)	Insp. Level or Code	Sym.	LIMITS, NOTE 4						Units
						Min.	LAL	Bogie	UAL	Max.	ALD	
	QUALIFICATION APPROVAL TESTS											
3.1	Qualification Approval:	Required for JAN Marking	---	---								
---	Cathode:	Coated Unipotential	---	---								
3.4.3	Base Connections:	E9–1	---	---								
4.9.20.3	Vibration (1):	Rp= 2000; Note 2	---	---	Ep	---	---	---	---	300	---	mVac
	MEASUREMENTS ACCEPTANCE TESTS, Part 1, Note 3											
4.10.8	Heater Current		---	---	If:	---	432	450	468	---	36	mA
4.10.8	Heater Current:		0.65	II	If:	420	---	---	---	480	---	mA
4.10.15	Heater-Cathode Leakage:	Ehk=+ 100 Vdc Ehk=− 100 Vdc Note 2	0.65	II	Ihk: Ihk:	--- ---	--- ---	--- ---	--- ---	7 7	--- ---	µAdc µAdc
4.10.6.1	† Grid Current:	Rg=0.5 Meg;Note 2	0.65	II	Ic:	0	---	---	---	-0.5	---	µAdc
4.10.4.1	Plate Current (1):	Eb= 100 Vdc; Rk = 0; Notes 2, 26	---	---	Ib:	---	14.7	17.0	19.3	---	4.8	mAdc
4.10.4.1	† Plate Current: (1)	Eb= 100 Vdc; Rk= 0; Notes 2, 26	0.65	II	Ib:	12.0	---	---	---	22.0	---	mAdc
4.10.5.2	Grid Voltage:	Ec/Ib= 150uAdc; Rk=0; Note 2	0.65	II	Ec:	---	---	---	---	-7.5	---	Vdc
4.10.5.2	Grid Voltage Difference Between Sections:	Ec/Ib=150µAdc; Rk= 0; Note 2	0.65	II	ΔEc:	---	---	---	---	1.5	---	Vdc
4.7.5	Continuity and Short: (Inoperatives)		0.4	II		---	---	---	---	---	---	
4.9.1	Mechanical:	Envelope Outline No. 6–8	---	---		---	---	---	---	---	---	
	MEASUREMENTS ACCEPTANCE TESTS, Part 2											
4.8	Insulation of Electrodes:	Eg-all = −100Vdc Ep-all = −300Vdc Note 2	2.5	L6	R R	100 100	--- ---	--- ---	--- ---	--- ---	--- ---	Meg Meg
4.10.4.1	Plate Current (2):	Ef=5.7V; Eb =100 Vdc; Rk= 0; Notes 1, 2, 25, 26	2.5	I	Δ Ib: Ef	---	---	---	---	15	---	%
4.10.6.2	Grid Emission:	Ef=7.5V; Ec= −30Vdc; Rg= 0.5Meg; Notes 2, 18, 25	2.5	I	Isc:	0	---	---	...	-1.0	---	µAdc
4.10.3.1	RF Noise:	Ecal=15mVac; Rk=220; Ck=0.2uf; Notes 7, 19	2.5	I		---	---	---	---	---	---	
4.10.3.5	Noise & Microphonics:	Ef=6.3Vac; Ebb=250Vdc; Ecal=200mVac; Rp=0.1Meg; Rk=1000; Ck=1000uf; Notes 7, 20, 25	2.5	I		---	---	---	---	---	---	
4.10.4.1	Plate Current (3):	Note 2	2.5	I	Ib:	6.3	---	---	---	10.7	---	mAdc
4.10.9	Transconductance:	Note 2	2.5	I	Sm:	5300	---	---	---	8100	---	µmhos
4.10.11.1	Amplification Factor	Note 2	6.5	L6	Mu:	39	---	---	---	55	---	

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Ref.	Test	Conditions	AQL(%)	Insp. Level or Code	Sym.	LIMITS Min.	LAL	Bogie	UAL	Max.	ALD	Units
	MEASUREMENTS ACCEPTANCE TESTS, Part 2, (cont'd.)											
4.10.7.5	Pulse Cathode Current:	Rk=0; Note 27	6.5	L6	ik:	160	---	---	---	---	---	ma
4.10.14	Capacitance:	No Shield; Note 2			Cgp:	2.4	---	---	---	3.6	---	μμf
		No Shield; Note 2			Cin:	3.0	---	---	---	5.0	---	μμf
		No Shield; Section 1			Cout:	0.37	---	---	---	0.57	---	μμf
		No Shield; Section 2	6.5	Code E	Cout:	0.30	---	---	---	0.46	---	μμf
		No Shield			Cpp:	---	---	---	---	0.90	---	μμf
		No Shield			Cgg:	---	---	---	---	0.03	---	μμf
		No Shield; Note 2			Chk:	3.0	---	---	---	5.0	---	μμf
4.9.12.1	Low Pressure Voltage Breakdown:	Pressure=55±5mm Hg.; Voltage=500Vac	6.5	Note 5		---	---	---	---	---	---	
4.9.19.1	Vibration(2):	Rp=2000; Note 2	6.5	Code I	Ep:	---	---	---	---	300	---	mVac
	DEGRADATION RATE ACCEPTANCE TESTS, Note 6											
4.9.20.5	Shock:	Hammer Angle=30°; Ehk=+100Vdc; Note 8	---	---		---	---	---	---	---	---	
4.9.20.6	Fatigue:	G=2.5; Fixed Frequency; F=25 min., 60 max.	6.5	Note 5		---	---	---	---	---	---	
---	Post Shock & Fatigue Test End Points:	Vibration(2)	---	---	Ep:	---	---	---	---	450	---	mVac
		Heater-Cathode Leakage										
		Ehk=+100Vdc	---	---	Ihk:	---	---	---	---	20	---	μAdc
		Ehk=−100Vdc	---	---	Ihk:	---	---	---	---	20	---	μAdc
		Plate Current (1)	---	---	Ib:	11.0	---	---	---	---	---	mAdc
		Grid Current	---	---	Ic:	0	---	---	---	-0.7	---	μAdc
4.9.6.1	Miniature Tube Base Strain:		---	---		---	---	---	---	---	---	
---	Glass Strain:	Note 9	2.5	I		---	---	---	---	---	---	

Ref.	Test	Conditions	AQL(%)	Insp. Level or Code	Allowable Defectives per Characteristic: 1st Sample	Combined Samples	Sym.	LIMITS Min.	Max.	Units
	ACCEPTANCE LIFE TESTS, Note 6									
4.11.7	Heater Cycling Life Test:	Ef=7.5V; Ehk=+135 Vdc; Ec=Eb=0; Rk=0; Notes 10,25	---	---	---	---		---	---	
4.11.4	Heater Cycling Life Test End Points:	Heater-Cathode Leakage								
		Ehk=+100Vdc	---	---	---	---	Ihk:	---	15	μAdc
		Ehk=−100Vdc	---	---	---	---	Ihk:	---	15	μAdc
---	Stability Life Test: (1 hour)	Ebb=Ecc=180Vdc;Ehk=+135 Vdc;Rk=0;Rg/g=3.9Meg; Rp/p=3900; TA=Room; Notes 2, 11	1.0	Code 1	---	---		---	---	
4.11.4	Stability Life Test End Points:	Change in Plate Current (1) of Individual tubes	---	---	---	---	Δ_t Ib:	---	10	%
---	Survival Rate Life Test: (100 hours)	Stability Life Test Conditions or Equivalent; Notes 2, 12, 13	---	II	---	---		---	---	
4.11.4	Survival Rate Life Test End Points:	Continuity and Shorts (Inoperatives)	0.65	---	---	---		---	---	
		Plate Current (1)	1.0	---	---	---	Ib:	11.0	---	mAdc

Ref.	Test	Conditions	AQL(%)	Insp. Level or Code	Allowable Defectives per Characteristic 1st Sample	Combined Samples	Sym.	LIMITS Min.	Max.	Units
ACCEPTANCE LIFE TESTS, Note 6, (cont'd)										
4.11.5	Intermittent Zero Bias Life Test (1):	Stability Life Test Conditions; T Envelope=140°C min.; Notes 2, 14, 15	---	---	---	---		---	---	
4.11.4	Intermittent Zero Bias Life Test (1): End Points (500 hours)	Note 16								
		Inoperatives; Note 17	---	---	1	3		---	---	
		Grid Current	---	---	1	3	Ic:	0	-0.5	μAdc
		Change in Plate Current (1) of individual tubes	---	---	1	3	$\Delta_t Ib$:	---	20	%
		Plate Current (2)	---	---	2	5	$\Delta_{Ef} Ib$:	---	15	%
		Plate Current (1) average change	---	---	---	---	Avg $\Delta_t Ib$:	---	15	%
		Total Defectives	---	---	3	7		---	---	
4.11.4	Intermittent Zero Bias Life Test(1) End Points: (1000 hours)	Note 16								
		Inoperatives; Note 17	---	---	2	5		---	---	
		Grid Current	---	---	2	5	Ic:	0	-0.5	μAdc
		Change in Plate Current (1) of individual tubes	---	---	2	5	$\Delta_t Ib$:	---	25	%
		Total Defectives	---	---	4	8		---	---	
4.11.5	Intermittent Life Test(2):	Eb=250 Vdc; Ec=0; Ehk=-135 Vdc; Rk/k=560; Rg/g=0.5 Meg; Notes 2, 14	---	---	---	---		---	---	
4.11.4	Intermittent Life Test(2): End Points: (500 hours)	Note 16								
		Inoperatives; Note 17	---	---	1	3		---	---	
		Grid Current	---	---	1	3	Ic:	0	-0.5	μAdc
		Heater Current	---	---	1	3	If:	420	485	mA
		Transconductance	---	---	1	3	Sm:	4800	8100	μmhos
		Heater-Cathode Leakage Ehk=+100 Vdc	---	---	1	3	Ihk:	---	7	μAdc
		Ehk=-100 Vdc					Ihk:	---	7	μAdc
		Insulation of Electrodes Eg-all=-100 Vdc	---	---	2	5	R:	125	---	Meg
		Ep-all=-300 Vdc					R:	125	---	Meg
		Total Defectives	---	---	4	8		---	---	
4.11.4	Intermittent Life Test(2) End Points: (1000 hours)	Note 16								
		Inoperatives; Note 17	---	---	2	5		---	---	
		Grid Current	---	---	2	5	Ic:	0	-0.5	μAdc
		Heater Current	---	---	2	5	If:	420	490	mA
		Transconductance	---	---	2	5	Sm	4350	8100	μmhos
		Heater-Cathode Leakage Ehk=+100 Vdc	---	---	2	5	Ihk:	---	7	μAdc
		Ehk=-100 Vdc					Ihk:	---	7	μAdc
		Insulation of Electrodes Eg-all=-100 Vdc	---	---	2	5	R:	100	---	Meg
		Ep-all=-300 Vdc					R:	100	---	Meg
		Total Defectives	---	---	5	10		---	---	
---	Interface Life Test:	Ef=6.6 V; other electrodes disconnected; Notes 25, 28	---	---	---	---	t:	500	---	hrs
4.11.4	Interface Life Test End Points:	Ef=6.0±0.05 Vdc; Eb=125 Vdc; Ec/Ib=2.5 mAdc; Rk=0; Notes 25, 29, 30	---	---	1	3	Ri:	---	50	ohms
---	Pulse Life Test:	Eb=180 Vdc; Rk=0; Notes 25, 31	---	Code F	---	---	t:	500	---	hrs

Ref.	Test	Conditions	AQL(%)	Insp. Level or Code	Allowable Defectives per Characteristic 1st Sample	Combined Samples	Sym.	LIMITS Min.	Max.	Units
	ACCEPTANCE LIFE TESTS, Note 6 (cont'd)									
4.11.4	Pulse Life Test	Inoperatives; Note 17	---	---	1	3		---	---	
	End Points:	Pulse Cathode Current	---	---	1	3	ik:	150	---	ma
	PACKAGING REQUIREMENTS									
4.9.18.1.1	Container Drop:	(d) Package Group 1; Container Size C								

Note 1: Plate Current (2) is the percent change in Plate Current (1) of an individual tube resulting from the change in Ef.

Note 2: Test each unit separately.

Note 3: The AQL for the combined defectives for attributes in Measurements Acceptance Tests, Part 1, excluding Inoperatives and Mechanical shall be one (1) percent. A tube having one (1) or more defects shall be counted as one (1) defective. MIL–STD–105, Inspection Level II shall apply.

Note 4: Variables Sampling Procedure:
See paragraphs 5.3.3 to 5.3.3.4, inclusive, of the Inspection Instructions for Electron Tubes.

Note 5: This test shall be conducted on the initial lot and thereafter on a lot approximately every 30 days. When one lot has passed, the 30-day rule shall apply. In the event of lot failure, the lot shall be rejected and the succeeding lots shall be subjected to this test until a lot passes. MIL-STD-105, sample size code letter F shall apply.

Note 6: Destructive Tests:
Tubes subjected to the following destructive tests are not to be accepted under this specification.

4.9.20.5	Shock
4.9.20.6	Fatigue
4.11.7	Heater-Cycling Life Test
4.11.5	Intermittent Life Test
---	Interface Life Test

Note 7: Tie lk to 2k; 1g to 2g; and 1p to 2p.

Note 8: Rg/g = 0.1 Meg; Rg not to be used when thratron type short indicator is used.

Note 9: Glass Strain Procedures – All tubes subjected to this test shall have been sealed a minimum of 48 hours prior to conducting this test. All tubes shall be at room temperature. The entire tube shall be immersed in water at not less than 97°C for 15 seconds and immediately thereafter immersed in water at not more than 5°C for 5 seconds. The volume of water shall be large enough that the temperature will not be appreciably affected by the test. The holder shall be in accordance with Drawing #245-JAN, and the tubes shall be immersed quickly. The tubes shall be so placed in the water that no contact is made with the containing vessel, nor shall the tubes contact each other. After the 5-second submersion period, the tubes shall be removed and allowed to return to room temperature on a wooden surface. After drying at room temperature for a period of 48 hours, the tubes shall be inspected and rejected for evidence of air leaks (Ref. MIL-E-1, Par. 3.2.4.3). Electrical rejects, other than inoperatives, may be used in the performance of this test.

Note 10: The no-load to steady state full load regulation of the heater voltage supply shall be not more than 3.0 percent. This test shall be made on a lot by lot basis. A failure or defeat shall consist of an open heater, open cathode circuit, heater-cathode short, or heater-cathode leakage current in excess of the specified heater cycling life test end point limit.

Note 11: Stability Life Test: The sampling and testing procedure for this test shall be in accordance with paragraphs 5.3.4.1(a) to 5.3.4.1(g), inclusive, of the Inspection Instructions for Electron Tubes.

Note 12: SURVIVAL RATE LIFE TEST: The sampling and testing procedure for this test shall be as defined in paragraphs 5.3.4.2 to 5.3.4.2.4, inclusive, of the Inspection Instructions for Electron Tubes.

Note 13: For Survival Rate Life Test, the equivalent Stability Life Test conditions shall be as defined in paragraph 5.3.4.2.5 of the Inspection Instructions for Electron Tubes.

Note 14: Intermittent Life Tests: Sampling and acceptance procedures for these tests shall be as defined in paragraphs 5.3.4.3(a) to 5.3.4.3(i), inclusive, of the Inspection Instructions for Electron Tubes, except that the following subparagraph shall be added to 5.3.4.3(e): (4) The life test sample from the first lot accepted each month shall continue on life test for an additional 500 hours (1000 hours total life test time). Failure of this sample to meet the 1000-hour life test end points shall result in loss of eligibility for reduced hours testing.

Note 15: Envelope Temperature is defined as the highest temperature indicated when using a thermocouple of #40 BS or smaller diameter elements welded to a ring of 0.025 inch diameter phosphor bronze in contact with the envelope. Envelope Temperature requirement will be satisfied if tube, having bogie Ib(± 5%) under normal test conditions, is determined to operate at minimum specified temperature at any point in the life test rack.

Note 16: Order for Evaluation of Life Test Defects: See Paragraph 5.3.4.4 of the Inspection Instructions for Electron Tubes.

Note 17: An inoperative as referenced in Life Test is defined as a tube having one (1) or more of the following defects: discontinuity (Ref. MIL-E-1, par. 4.7.1), shorts (Ref. MIL-E-1, par. 4.7.2), air leaks (Ref. MIL-E-1, par. 3.2.4.3).

Note 18: Prior to this test, tubes shall be preheated a minimum of five (5) minutes with all sections operating at the conditions indicated below. Three minute test is not permitted. Test within three seconds after preheating. Grid Emission shall be the last test performed on the sample selected for Grid Emission test.

Ef	Ecc	Ebb	Rg/g	Rp/p	Rk/k
V	Vdc	Vdc	Meg	ohms	ohms
7.5	180	180	3.9	3900	0

Note 19: In addition to the rejection criteria of Par. 4.10.3.1, MIL-E-1, the output shall be read on a VU meter using a rejection limit of five (5) VU. Five (5) VU is the meter deflection obtained with a steady state output of 3 mW from the amplifier.

Note 20: The rejection level shall be set at the VU meter reading obtained during calibration.

Note 21: Test each unit separately with normal test voltages applied to the opposite section.

Note 22: Rating based on a pulse of 10 microsecond duration, 1 percent duty cycle, and 1000 pps repetition rate.

Note 23: For pulse voltage of less than 1 percent duty cycle, the peak voltage may be 150 volts maximum.

Note 24: The design-maximum rating for the combined plate dissipation of both plates is 4.0 watts.

Note 25: Tie heaters in parallel.

Note 26: Tie each grid through a 500,000 ohms resistor (±1%) to the corresponding plate.

Note 27: E1c = E2c = −20Vdc. Grid is driven with pulse circuit as follows: e1c = e2c = + 10v; prr = 1000pps; tp = 10us; tr $<$ 1us; tf $<$ 1us; Read peak cathode current in each section separately with opposite section operating under pulse conditions. Preheat at Ef = 6.3V, with heaters in parallel, for 5 minutes and with no other voltages applied.

Note 28: The life test sample shall consist of 20 tubes, and not more than one (1) tube failure shall be permitted. In the event of rejection of the first sample due to failure of more than one (1) tube, a second sample of 40 tubes shall be selected from the lot. Acceptance shall then be based on the combined first and second samples. The total tube failures from the combined first and second samples shall not exceed three (3). A life test defect is defined as a failure to meet the life test end point limits as specified in the tube specification sheet. The life test sample shall be read at zero hours and 500 hours (plus 48 hours, minus 24 hours).

Note 29: Preheat approximately 5 minutes prior to testing, using either Ef = 12.0V (heaters in series) or Ef = 6.0V (heaters in parallel) & other electrodes disconnected. Test each section separately. No other test shall be made from the start of the Interface Life Test until after the measurement of the end point characteristic following completion of the indicated minimum of life test hours.

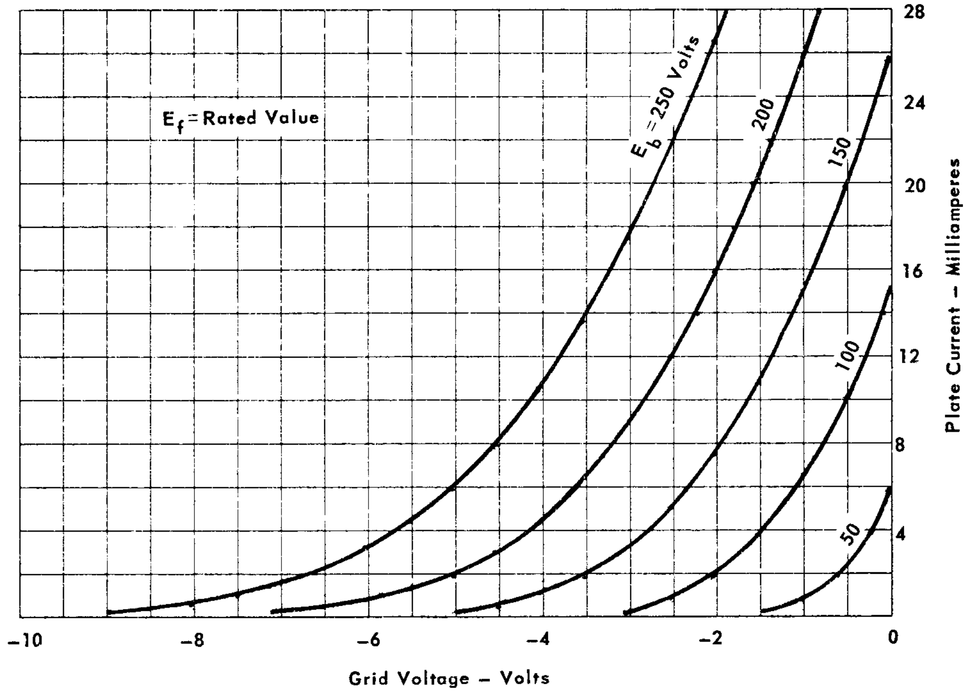
Note 30: The value of interface resistance shall be measured in the standard test circuit, Drawing 248-JAN. As an alternative, a test method known to correlate with the method and conditions specified in this specification sheet may be utilized.

Note 31: E1c = E2c = −20Vdc (grid leak bias is permissible); Rg/g = 50 ohms; Rp/p = 200 ohms. Grid is driven with pulse circuit as follows: tp = 10 us ± 1 us; duty cycle = 1% ± 0.1%; tr < 1.5us; tf < 2.5us; e1c = e2c = + 11.5 volts (driver side of Rg).

MINIATURE MEDIUM-MU DOUBLE TRIODE

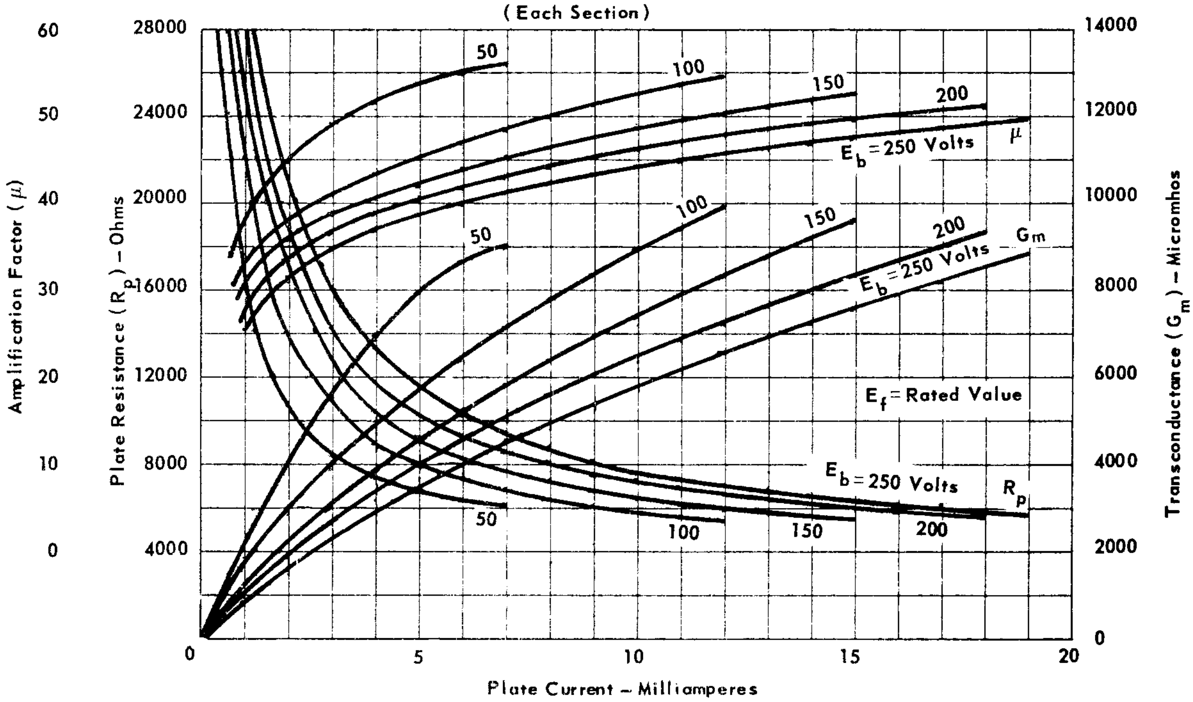
AVERAGE TRANSFER CHARACTERISTICS

(Each Section)



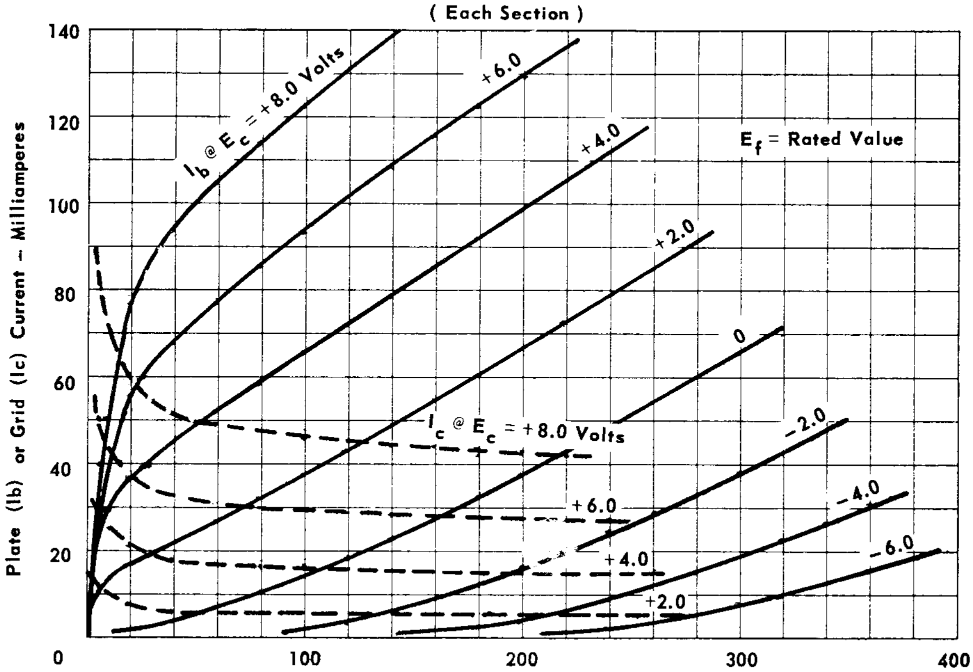
AVERAGE CHARACTERISTICS

(Each Section)



AVERAGE PLATE CHARACTERISTICS

(Each Section)



AVERAGE PLATE CHARACTERISTICS

(Each Section)

